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ABSTRACT

Examined was the performance of 18 normal and 20 learning disabled (LD) 8- to 9-year-old children on two competitive measures of auditory discrimination. Ss were administered the Wepman Auditory Discrimination Test (1974) and the Goldman, Fristoe, Woodcock Test of Auditory Discrimination (1970). Results suggested that little correlation exists between the two tests which are frequently viewed as interchangeable. No differences between the two groups were found in auditory discrimination skills as measured by the two instruments. (Author/CL)

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AUDITORY DISCRIMINATION OF NORMAL AND LEARNING DISABLED CHILDREN: A COMPARISON OF THEIR PERFORMANCE ON THE GOLDMAN-FRISTOE-WOODCOCK TEST OF AUDITORY DISCRIMINATION AND WEPMAN AUDITORY DISCRIMINATION TEST

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AUDITORY DISCRIMINATION OF NORMAL AND LEARNING DISABLED CHILDREN: A COMPARISON OF THEIR PERFORMANCE ON THE GOLDMAN-FRISTOE-WOODCOCK TEST OF AUDITORY DISCRIMINATION AND WEPMAN AUDITORY DISCRIMINATION TEST

One of the current trends in educational and psychological assessment is to establish the presence of intraindividual perceptual differences which are presumed to influence the acquisition of basic academic skills. Professionals and publishers have responded to this trend by preparing and marketing diagnostic instruments designed to identify modality and process differences. Teachers commit instructional time to remediation of identified perceptual deficits. While conceptually this much endorsed procedure appears logical, two factors are of concern to today's practitioner: (1) literature that questions the relationship of measures of perceptual facility and academic achievement, and (2) selection of the most valid assessment instrument from those available.

Looking at developmental characteristics of perceptual abilities, some think that undue attention has been directed at early deficits. Snyder and Pope (1972) report considerable variation in six year old children's auditory and visual functions and suggest that observed deficits at this very young age may be the result of normal variation. They report that a sharp decrease in the number of auditory discrimination errors appears to occur very rapidly within a span of several months. Based upon their findings one might conclude that perhaps too much reverence is being given to deficits observed at very young ages (C.A. 6 or below) and that educational programming based on such deficits may

be somewhat premature. This is particularly true if the reliability and validity of means for measureing such deficits are in question.

For example, Snyder and Pope found the norms for their six year old sample (n = 204) at variance with those reported by Wepman for the Auditory Discrimination Test. Mean errors for the Snyder and Pope six year group was 7.0 with a standard deviation of 3.5 whereas Wepman's norms suggest that 6.0 errors at six years would indicate an auditory discrimination problem. According to Snyder and Pope, a similar number of mean errors reoccured in a study using an additional 150 first graders. Osborn, Osborn and Brown (1976), collecting data on the performance of rural black and white children who lived in Georgia also found their sample norm varied when compared with reported Wepman norms. They also reported lower test-retest reliability (r = .66, n = 145).

Even if auditory deficits do exist and are lasting, there seems to be several variables which may not have been fully controlled in measurement of these abilities. Schwartz and Goldman (1974) investigated variables which were believed to have influence on speech-sound discrimination tests. Seventy-two children from nursery, kindergarten and first grade classes were presented auditory discrimination tasks where the context of the stimulus was varied and two conditions (quiet and noise) were used. Findings suggested that age, context and conditions were significant variables. A reduction in errors was observed as: (1) age increased, (2) in quiet conditions when compared to noise, and (3) when the stimulus was presented within either a carrier-phase context or a sentence context. When the task was presented using a paired-comparison context (pin-pen) without the aid of the acoustic

characteristics of preceding and following sound or linguistic cues, accuracy of discriminations was reduced.

Similar findings were reported by Nober and Nober (1975), who investigated the effect of noise on auditory discrimination abilities of normal and learning disabled children. Two groups of twenty children each were randomly selected. The LD sample met criteria for inclusion in Massachusetts' program for learning disabled. The chronological age range of the two samples was 9.0 to 11.8. Each subject was presented Form I and Form II of the Wepman Auditory Discrimination Test in a single twenty minute session. Order of the two presentations was randomized. Error scores were analyzed with significant differences occurring in the two contexts for both groups of children. The Nobers also found a significant difference between the performance of the LD and normal sample. These findings have suggested that our univariant procedures for assessment of auditory discrimination abilities may be somewhat misleading and that environmental changes do influence one's performance.

Others (Risko, 1973; Hammill and Larsen, 1974; Larsen, et. al., 1976) have examined the relationship between auditory discrimination and academic achievement. The ease of such investigations has been impaired by the variety of instruments which are used as auditory discrimination measures.

Risko (1973) sampled the performance of eighty-one children enrolled in grades one through three on sixteen auditory discrimination skills. The child's task required selective hearing of initial, middle and ending sounds and making comparisons with sounds of other words. Subtest sixteen was the presentation of the conventional word pairs where

fine discrimination was required. Results suggest that while some of the sixteen skills do correlate significantly with reading as measured by the Metropolitan Achievement Test, subtest sixteen, discrimination of minimal pairs of words, did not at any grade level.

Hammill and Larsen (1974) reviewed thirty-three studies which investigated the relationship of a variety of auditory perceptual skills and reading. Their conclusion was that combined auditory perceptual skills as measured were not ". . . usefully related to reading (page 433)."

In a follow-up study by Larsen, et. al. (1976), the performance of eighty-nine normal and LD children (C.A.'s 8-5 to 10-6) was observed on a battery of five perceptual tests representing the visual and auditory modality. The LD sample was divided into two groups. One group was reading one grade below expectancy and group two was reading two grades below expectancy. (Expectancy was determined by using chronological age.) No significant difference was found between the performance of the LD and the normal groups on the three auditory perceptual tasks (Wepman, Auditory Sequential Memory--ITPA, Sound Blending--ITPA). The only significant difference observed was between the group's performance on the Bender Visual-Motor Gestalt Test.

So it is that definitive data is lacking which demonstrates: (1) the relationship between academic achievement and auditory discrimination, or (2) the superiority of one assessment procedure or instrument. This study addresses two major questions that relate to the two previously mentioned concerns through focus on one hypothesized factor in academic achievement, auditory discrimination. The first question considered concerns the purported difference between the auditory

discrimination of normally achieving children and children exhibiting specific learning disabilities. If such differences can not be demonstrated, one might question the instructional attention given to identified auditory discrimination deficits and certainly the practice of partitioning high and low risk children on the basis of this factor. The second question examined concerns the degree of correlation between two competing assessment instruments, the Revised Wepman Auditory Discrimination Test (1973) and the Goldman, Fristoe, Woodcock Test of Auditory Discrimination (1970), which purport to assess the common factor, auditory discrimination. This question is of particular value to the diagnostician who seeks to obtain the maximum amount of information with the minimum amount of time and inconvenience to both the examinee and the examiner. If the two instruments are highly correlated then, when appropriate, they could be used interchangeable according to personal preference of the diagnostician.

A review of the testing format reveals considerable difference between the Wepman and G-F-W. Of the two, the Wepman allows the greatest administrative ease. Forty word pairs are presented orally by the examiner using a prescribed seating arrangement and rate of presentation. The subject is asked to indicate whether the words within a pair presented orally by the examiner are the same or different. Differences are slight and involved one phoneme in various positions. A minimal amount of time is required which generally does not exceed five to ten minutes. This simplicity has become a target for criticism.

Authors of the G-F-W present their instrument as a more valid means for assessing auditory discrimination abilities. Citing the previous

factors of: (1) non-standard presentation of stimulus word pairs, (2) the possibility of unfamiliarity of stimulus words, (3) the possible confounding memory factor, and (4) the artificial nature of the testing environment, the G-F-W is presented as being responsive to each of these criticisms. To reduce the influence of suggested confounding factors, G.F.W authors have offered an instrument which: (1) is presented via a tape recorded stimulus, (2) has a series of training plates to teach the auditory-visual associations for each stimulus word, (3) offers a stimulus plate with four graphic illustrations from which the subject points or otherwise indicates the correct response and (4) examines auditory discrimination skills with both a quiet and noise background. The time factor is understandably lengthened, and in some respects, administrative ease is reduced because of the equipment required and mechanical timing.

Given these instrument differences, the second major question, inter-instrument correlation, is essential to the consumer. If high positive correlations are found between these two instruments, then the selection of one becomes a matter of the diagnostician's preference. However, if correlation is not sufficiently high to suggest interchangeability, selection of one or neither seems indicated.

THE STUDY

Sample

Recent research indicates that auditory discrimination is a developmental process which in most children stabilizes by age nine (Turiads, Wepman and Morency, 1972). Younger children, especially those of

beginning school age, tend to display considerable variability with regard to auditory discrimination which may or may not suggest lasting perceptual deficits (Snyder and Pope, 1972; Schwartz and Goldman, 1972). To minimize this possible source of variation, all subjects in this study were of age 8-0 to 9-0.

Two groups of children enrolled in the Montgomery County, Virginia School division during the 1974-75 school year were selected as representative samples of normally achieving children and children exhibiting specific learning disabilities. The former sample ($n_1 = 18$) was randomly selected from heterogeneous class roosters within the school district. Each child's classroom teacher was requested to make a subjective judgment concerning the child's academic achievement via the following question: "Based on your experience with children of this age, would you consider this individual's achievement level as average, above average, or below average?" The 18 children contained in the normally achieving sample were rated as either average or above average with regard to academic achievement.

The sample ($n_2 = 20$) of SLD children was selected from schools in the system's SLD program. Criteria for assignment to this group was based on two factors: (1) the existing diagnostic label of SLD, and (2) parental permission to participate in the study. In each case, the child had been evaluated and diagnosed as SLD by a certified school psychologist. The specific nature of the learning disability varied and will therefore not be defined.

Methodology

Each child in the two samples was administered both the Wepman

Auditory Discrimination Test and the Goldman, Fristoe, Woodcock Test of Auditory Discrimination. The order in which the instruments were presented was random, i.e., one-half of each sample was randomly selected to receive the Wepman first with the remaining sample half being administered the G-F-W. Prior to taking the appropriate second test, the subjects were provided a fifteen minute break to minimize fatigue. Both tests were given within a forty-five minute period.

Since the G-F-W consists of two separate components (Quiet and Noise Subtests), it was treated as two different instruments for the purpose of this study. The data base therefore consisted of three measurements of auditory discrimination (Wepman, G-F-W Quiet and G-F-W Noise) on each of the 38 experimental subjects. All observations were in terms of raw scores.

Analysis

One of the major objectives in this study was to determine if differences could be demonstrated in auditory discrimination skills of normal achieving and SLD children. If such differences exist the populations of normally achieving children and SLD children would differ with respect to raw mean error scores on discriminating tests. It was therefore proposed that a test be made of the composite hypothesis that these two groups arose from populations with a common mean vector ($H_o : \mu_{NAC} = \mu_{SLD}$ versus $H_1 : \mu_{NAC} \neq \mu_{SLD}$), and if this hypothesis was rejected, that simultaneous confidence intervals be constructed for the purpose of determining for which instrument or instruments there existed a significant difference in mean scores. The occurence of a significant difference(s) would then suggest that the corresponding

instrument(s) could be used for diagnostic purposes.

The above hypothesis was examined using Hotelling's T^2 statistic for testing hypotheses concerning the difference between mean vectors of two independent multivariate normal populations (Morrison, 1967). In addition to the assumption of normality, this procedure also requires equality of covariance matrices. The hypothesis of a common covariance matrix ($H_1 : \Sigma_{NAC} = \Sigma_{SLD}$ versus $H_1 : \Sigma_{NAC} \neq \Sigma_{SLD}$) was therefore tested prior to considering the hypothesis of interest (See Table 1).

It was found that the probability that the two samples came from multivariate populations with a common covariance matrix was relatively high ($p > .2$). Based on this evidence and a subjective judgment concerning the normality requirement, it was assumed that the conditions necessary to test for equality of mean vectors were satisfied. The value of Hotelling's T^2 statistic ($T^2 = 6.8589$) was not significant at the $\alpha = 0.1$ level. Consequently, there is no evidence to reject the hypothesis that SLD children do equally as well as normally achieving children on the Wepman, G-F-W Quiet and G-F-W Noise tests. While the two samples employed are only of moderate size, this result does cause one to question the attention that is given to assumed auditory discrimination differences between the populations of SLD children and normal achievers.

As noted earlier, a second question of interest concerns the interchangeable use of the Wepman and G-F-W tests in the assessment of auditory discrimination skills. One would expect that if the two instruments are measures of the same factor, scores on the two tests would exhibit some degree of correlation. Table 2 reports the product-moment inter-

TABLE 1

DATA FOR THE COMPARISON OF MEAN VECTORS

Test	Group	
	Normal Achievers (n_1 = 18)	SLD (n_2 = 20)
	(Means)	(Means)
Wepman	3.44	5.00
G-F-W Quiet	1.28	2.05
G-F-W Noise	10.56	12.35

correlations among the Wepman, G-F-W Quiet and G-F-W Noise tested. While these correlations are based on raw error scores, it is noted that very similar results were obtained using normalized T-scores for all three tests. (T-scores for the Wepman were approximations due to the manner in which this instrument is standardized.) Also, equivalent correlation coefficients were obtained employing Spearman's rank correlation coefficient (See Table 2).

DISCUSSION

While earlier writings have suggested auditory discrimination as one factor upon which learning disabled and normal achievers could be partitioned, present findings contradict this supposition. Apparently, both groups of children have members who have poor as well as efficient auditory discrimination skills. In the group of normal achievers with auditory discrimination deficits, one might well ask what integrities are operating in a proficient compensatory manner so that learning problems do not result. A possible question for further investigation would be whether two similar groups (normal achievers and SLD) would differ on selected measures of both auditory and visual perception. If the present finding of no differences with regard to one auditory process was also demonstrated between the two groups when the similar visual perceptual sub-skill was examined, then the practice of training for discrimination would be somewhat discredited. Is it that the major discriminator for successful achievement is not perceptual subskills which we currently seek to measure and train but rather the efficiency of internal integration and manipulation of received sensory data?

TABLE 2

INTERCORRELATIONS AMONG THE WEPMAN
G-F-W QUIET AND G-F-W NOISE

	Group			
	Normal Achieving (n_1 = 18)		SLD (n_2 = 20)	
Test	G-F-W Quiet	G-F-W Noise	G-F-W Quiet	G-F-W Noise
Wepman	0.2159 (0.6056)*	-0.0367 (0.8796)*	0.3377 (0.1422)*	-0.0772 (0.7448)*
G-F-W Quiet		-0.0621 (0.8015)*		0.4020 (0.0759)*

*Probability r will assume a value greater than the absolute value of that observed under the hypothesis of independence (H_o: $\rho = 0$).

The second finding is of equal concern to the authors. Because very little correlation was demonstrated between the two instruments, not only is there evidence to reject their interchangeability, but also there seems to be a question of which if either of the instruments do in fact measure the factor auditory discrimination. Authors of the Test of Auditory Discrimination suggest that lack of correlation is due to the effect of confounding factors. It would seem that identification of these hypothesized factors is essential. In the meantime, while face and content validity would lead the consumer to believe that selection of one instead of the other is a matter of clinical preference given the format differences, such a conclusion is not supported by present empirical evidence.

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